Unit 16
Day 2
Compound Interest

COMPOUND INTEREST is interest paid on both the principal and the interest of an investment.

If P dollars is deposited in an account paying an annual rate of interest r compounded n times per year, then after t years the account will contain A dollars, where

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

future value

present value

Using the abbreviation FV for future value and PV for present value, the formula for compound interest becomes,

$$FV = PV\left(1+\frac{r}{n}\right)^{nt}$$

Future value

Present value

Find the future value of $1000 invested at 9% compounded annually for 10 years.

$$FV = PV\left(1+\frac{r}{n}\right)^{n\cdot t}$$

$$FV = 1000\left(1+\frac{.09}{1}\right)^{10}$$

$$FV = \$2,367.36$$

Find the future value of $12,000 invested at 6% compounded quarterly for 5 years.

$$FV = 12{,}000\left(1+\frac{.06}{4}\right)^{20}$$

$$FV = \$16{,}162.26$$

Find the future value of $12,000 invested at 6% compounded monthly for 5 years.

$$FV = 12{,}000\left(1+\frac{.06}{12}\right)^{60}$$

$$FV = \$16{,}186.20$$

Find the present value of $12,250, assuming a 6% interest rate compounded annually for 10 years. In other words, what would one have to invest NOW to earn $12,250 at the end of 10 years?

FV

$FV = PV\left(1+\frac{r}{n}\right)^{nt}$

$12{,}250 = PV\left(1+\frac{.06}{1}\right)^{10}$

$PV = \frac{12{,}250}{(1+.06)^{10}}$

$PV = \$6840.34$

What is the future value of an investment of $2,000 invested at 4%, compounded monthly, for 11 months?

$FV = 2000\left(1+\frac{.04}{12}\right)^{11}$

$FV = \$2{,}074.57$

What interest rate would be required to allow an initial investment of $3,500.00 to yield $4,500.00 at the end of 5 years compounded quarterly?

PV FV

$FV = PV\left(1+\frac{r}{n}\right)^{nt}$

$4500 = 3500\left(1+\frac{r}{4}\right)^{20}$

$\frac{4500}{3500} = \left(1+\frac{r}{4}\right)^{20}$

$\left(\frac{4500}{3500}\right)^{1/20} = 1+\frac{r}{4}$

$\left(\frac{4500}{3500}\right)^{1/20} - 1 = \frac{r}{4}$

$r = 4\left(\frac{4500}{3500}\right)^{1/20} - 4$

$r = .05007$

5%

What interest rate would be required to allow an initial investment of $100,000 to yield to $181,871.97 at the end of 8 years compounded monthly?

$181{,}871.97 = 100000\left(1+\frac{r}{12}\right)^{96}$

7.5%

Homework
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Day 2

p. 371: 63-68, 72